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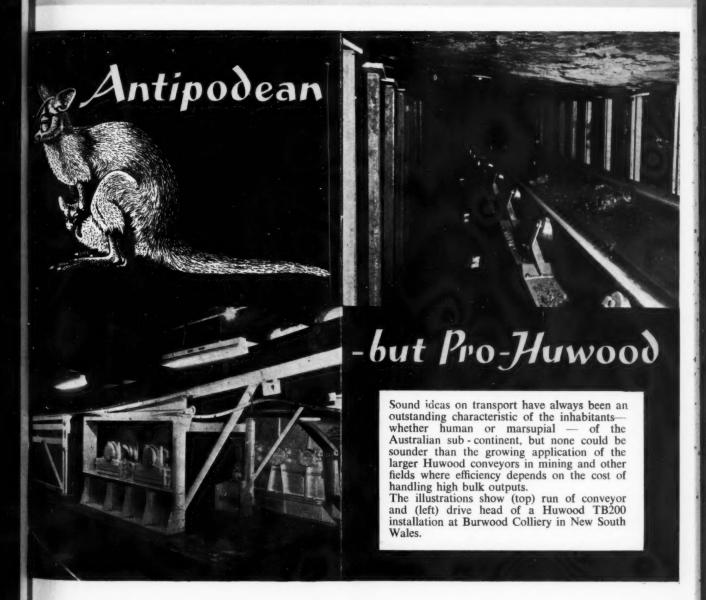
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Iron Ore for the U.S. Steel Industry

ONTRASTING sharply with the pressure from U.S. domestic mining interests for higher import quotas on certain metals, notably lead and zinc, is the urgency with which the American steel industry is seeking to assure its future requirements of the foreign ores on which it will be increasingly dependent in the years ahead.

There is perhaps no field of endeavour in which the mining industry has been more spectacularly successful in recent years than in the development of new resources of iron ore. From the Canadian Arctic to Chile, from the jungles of tropical Africa to Kazakhstan in the U.S.S.R., and also in the Far East, so many deposits of immense magnitude have been brought to light that one is apt to wonder how demand can conceivably keep pace with such a rapid growth in world reserves.

America's hunger for iron ore stems, of course, from the expansion of iron and steel production coupled with the dwindling of her own domestic resources of high grade ore, which, in conjunction, have brought about a drastic increase in the consumption of foreign ores. In a paper presented to the recent convention of the American Mining Congress at Denver, Colorado, Mr. R. W. Whitney, vice-president of the Hanna Mining Co., noted that U.S. iron imports had risen from about 2,800,000 tons in 1946, equivalent to about 4 per cent of the total ore consumed in the country, to nearly 28,000,000 tons, or about 27 per cent in 1958. It is considered that a figure of 60,000,000 tons annually may be reached by 1965.

In the light of these figures it is hardly surprising that the recent setback in the U.S. steel industry failed to halt the vast projects for the further expansion of ore production and for providing improved handling and transport facilities for imported ores.

Public attention has been focussed mainly on the multi-million dollar operations in Northern Quebec and Labrador with which American enterprise is closely identified, but it is noteworthy that for the time being Venezuela—where the largest producers are subsidiaries of U.S. steel companies—has displaced Canada as America's leading supplier of iron ore. Major stakes have also been acquired in Chile's rapidly expanding iron ore industry, as well as in Brazil and Peru. In Liberia, American and Swedish interests are co-operating in a \$200,000,000 project to exploit the Nimba ore field, build a 170-mile railway, and construct a deep water harbour.

Continental and Japanese steelmakers are also endeavouring to safeguard their long-term supply position by participating technically and financially in the development of foreign ore supplies, while the United Kingdom through B.I.S.C. (Ore) Ltd., apart from its long-term contracts with suppliers in Sweden, North Africa and Canada, has direct investments in Sierra Leone and French Guinea, and is also interested in the development of new deposits in Mauretania (West Africa). New ore fields claimed to be of unrivalled magnitude are in process of exploitation in the U.S.S.R.

It is quite evident that world iron ore supplies are more than ample for the immediate future. In fact, big tonnages were accumulated during the recent recession and production of some of the mines was reduced. Mr. Whitney emphasises, however, that over

the long term, new sources of major magnitude will have to be developed. As steel capacity increases in accordance with long-term plans, so also will world ore requirements expand. Most of this increased tonnage will come from sources now being mined or under development. For example, Canada, which currently can export 17,000,000 - 20,000,000 tons of ore annually to the U.S. and Europe, should be capable of exporting 34,000,000 tons a year by 1965.

Over the period 1900 - 1956 steel production increased at an average annual rate of just over 4 per cent per annum. Assuming that the annual increase in subsequent years will be in the region of 5 per cent (the recent recession being a temporary setback which should not appreciably affect the long-term picture), world steel output should rise to 940,000,000 L tons by 1980 from 287,000,000 tons in 1957. Assuming further, on what seems a conservative estimate, a world population of 3,628,000,000 by 1980, a steel output of 940,000,000 tons would represent a world consumption per head of about 550 - 600 ingot lb., compared with the present figure of about 250 lb. This would still be well below the U.K. figure of 785 lb. (in 1955) and less than half the U.S. figure of 1,360 lb. On the available data, this projection would thus appear to present a reasonable indication of future iron ore needs.

In The Mining Journal Annual Review 1956, p. 78, the view was expressed that, at the existing rate of consumption, world iron supplies would last for about 200 years, exclusive of deposits which, from their size, composition and location, could not be commercially exploited. On the assumption that all such known supplies could ultimately be worked up, then iron supplies would last for over 600 years. It follows that if world steel production were to treble in the next twenty years, as suggested in the preceding paragraph, supplies would last for only a third of the estimated times. On the other hand, the outlook has been substantially modified by the large additions to known supplies resulting from exploration and development during the past three years.

On the basis of these estimations, it can be concluded that the increasing consumption of iron ore which may be envisaged in the coming years is unlikely to lead to scarcity, so far as the foreseeable future is concerned. The actual and potential sources of supply appear to be a most unlimited, having regard to the rate at which new deposits still continue to be uncovered. The costs of opening up new orebodies are huge, however, and the problem for steel companies in the U.S. (and elsewhere) is that of finding and developing the most economical and dependable sources of supply. The company that is most successful in acquiring deposits of suitable grade, favourably situated in politically stable countries, will be in the strongest position to retain its markets by absorbing rising mill costs without increasing the prices of its own products.

A most significant point which Mr. Whitney made was that the greater the sums spent by the American steel industry on developing high-grade ores in out-of-the-way places, the more feasible it becomes to spend more money on ore beneficiation facilities nearer home. In conjunction with the recent blast furnace demands for higher quality raw materials, this has led to new processes of beneficiation, which have greatly widened the scope for low-grade ores. For example, a big expansion in the mining of iron ore in Michigan's Upper Peninsula is foreshadowed by the introduction of a system of "pelletizing", which will enable hematite ore pellets to be charged direct into the furnaces without further processing.

It would indeed be surprising if, as in the case of other metals, progress in extractive metallurgy does not push back the technological frontiers of payability, which is the unpredictable factor in any assessment of future ore supplies. Obviously the iron ore picture, as it exists today, could be profoundly altered by processes leading to the economic

development of low-grade ores, with which most countries including the United States are so abundantly endowed.

Meanwhile the seemingly insatiable appetite of the American steel industry for foreign ore is contributing to the economic development of other Free World countries by stimulating the expansion of iron ore production, which is rapidly becoming one of the largest dollar-earning industries on the American Continent.

CZECHOSLOVAKIA'S EXPANSION PROGRAMME

Czechoslovakia, like all the Communist countries, works to a planned target economy. In common with its neighbours East Germany and Poland, it is now faced with the task of expanding heavy industry as much as possible, with particular stress on the machine and plant-building industry. As was to be seen at the recent Czech Trade Fair at Brno, this branch of industry is to play an ever more important role in Czechoslovakia, which is becoming one of the major plant manufacturers in the East European sate'lite bloc.

The metallurgical industry is being built up in the province of Slovakia and rare metals are being prospected for and exploited in Bohemia, but as yet Czechoslovakia is really strong in three minerals only — hard coal, brown coal and iron ore. Imports of non-ferrous metals in particular seem certain to keep at a high or growing rate for years to come. Overall, targets are being met and rather improved upon; industrial production in the first half of this year was 101.7 per cent of the planned target and production some 11.2 per cent above output for the first six months of last year.

It is coal which is now breaking all production records as well as passing its own output targets and to which are attached the most ambitious plans for the future. Development in the industry is increasing at a steady rate; both the exploration begun on new sites and the bringing into operation of revolutionary mining equipment (reported in *The Mining Journal*, August 28) are to send up future output by quantities which in the case of brown coal amount to several millions of tonnes. New statistics from Prague show that in the first half of this year 14,016,000 tonnes of hard coal was produced in Czechoslovakia this being 100.5 per cent of the target figure set for the period and 103.6 per cent of the January-June, 1958, production. The figure for brown coal output over the period was up by 104.6 per cent on the 1958 half-yearly total—25,534,000 tonnes, or 101.6 per cent of the target.

Despite the huge stocks of coal lying unsold in Western Europe, Czechoslovakia was able to consolidate her position as an exporter to the West. In January to June of this year exports to Western Europe totalled 175,071 tonnes as against only 69,152 tonnes in the same period of 1958. Main customer is the neighbouring Austria.

The other traditional basic products of Czechoslovakia — iron and steel — are also receiving the full benefits of Governmental care. The Czech ferrous metals programme plans by 1965 a raw steel production of 10,000,000 tonnes annually.

In connection with this programme the country's manganese output has been built up. In fact, Czechoslovakia now has a surplus for export after covering its own demands.

Aluminium production, of great importance for the machine-building programme, is to be virtually doubled by the bringing into operation of an additional plant with an annual capacity of 22,000 tonnes at the Svaty works. This will bring the country's full capacity up to some 50,000 tonnes a year. In 1958, after a rise of 58 per cent of 1957 output, national production stood at 26,700 tonnes.

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Both lead and zinc output remained stagnant in Czechsolovakia last year. With a crude lead consumption of 35,000 tonnes annually, the country mined last year an amount no higher than the levels for the previous year and 1956 — being 6,000 tonnes (of lead contained in ore). Refined lead production, also unchanged since 1956, was last year 9,000 tonnes. Primary zinc production for 1958 was 20,000 tonnes, the annual total since as long ago as 1955. Demand grew over the year, however, from 42,000 tonnes to 45,000 tonnes of raw zinc.

Quicksilver output is also at stagnation point, according to the most recent figures available. In 1957, 25 tonnes were produced, as in both 1956 and 1955.

Precious metal production is rising, however, as indicated by the most recent figures — which were not issued until this summer. In 1957, 1,479 kilogrammes of gold were produced, as against 865 kg. in 1953 and 309 kg. in 1937. In the same year silver output was 87,371 kg., compared with a 1939 production of 34,321 kg.

Discovery and search work for rare metals continues. Uranium- and titanium-bearing minerals are being located in several parts of the country, while other minerals including wolfram and tin-wolfram, have also been found and are to be worked.

EXPLORATION IN UGANDA

Apart from the work of individual prospectors seeking higher priced minerals such as tin, bismuth, beryl, etc., exploration for comparatively low-grade orebodies, involving the examination of large areas of land, is in the hands of two companies at present, states the Mines Department of the Uganda Protectorate in its annual report for 1958. In Toro, Kilembe Mines Ltd. are examining 303 sq. miles over the western end of the Ruwenzori Mountains, and Unicorn Mines Ltd. are examining 2 sq. miles at the eastern end of the Ruwenzori Mountains, some 20 miles east of Fort Portal. Unicorn Mines Ltd. are also examining an area of 38 sq. miles surrounding the Kitaka lead prospect on the Ankole/Toro border. In Kigezi a "gossan" occurrence is being drilled by the Geological Survey Department at Kanyamazinga.

Both Kilembe Mines Ltd. and Unicorn Mines Ltd., are using geochemical and geophysical methods in their exploration work and are relying on these methods in difficult country to eliminate those areas which seem unworthy of closer inspection. Soil sampling is proving effective over all these areas and seems to be a method suitable in Uganda for indicating anomalies in the mineralization where copper and lead are concerned. Selected areas of high anomalies have been core drilled and are now being explored underground within the area of Kilembe Special Mining Lease.

In these days of technical perfection the role of the lone prospector and small worker tends to be overshadowed comments the report. But these men and women have often been the founders of large mining fields. Their presence can be a significant pointer to zones of mineralization.

In the middle thirties the search for gold in Uganda filled the Western Province with prospectors and uncovered tin, wolfram, columbite/tantalite and beryl deposits. At the time of their original discovery many of these minerals were of no interest to miners. The advent of the war caused a change in mineral values and gold mining dwindled rapidly. From that time the number of prospectors and miners also dwindled. The prices obtained for all minerals but tin and gold have shown a distressing tendency to

fluctuate violently in value and the handling of small quantities of them by the local dealers has not proved economical. Tin and gold, on the other hand, are easily disposed of locally in any quantity. If a revival of the activities of the small worker is to be expected, it looks as if it must come from the working of these minerals.

DEVELOPMENTS IN RUSSIAN MINING MACHINERY

The Russians have now improved on their drilling installation for sinking mine shafts, which won a Grand Prix at the Brussels Fair, last year. Cutting a shaft 3.6 metres in diameter, reports *Moscow News*, they have produced a fully automatic drill which not only makes a cut of up to 5 metres in diameter, but can sink a drilling to a depth of up to 800 metres.

A Tass Agency report from Alma Ata, capital of Kazakhstan, states that two Kazakh scientists, Alexander Brichkin, a corresponding member of the Kazakh Academy of Sciences, and a post-graduate student named Albert Solotov, have developed what they have called a "cosmic drill", for use in hard rock, which works with temperatures three times as high as that of the sun's photosphere (the luminous envelope round the sun) and at cosmic velocities.

This device is essentially an electric arc unit, which emits a jet of temperature of the order of 15,000 deg. C. (that of the sun's photosphere is 5,800 deg. C.) at a velocity of more than 16 kms. per sec. which is close to the escape velocity of 16.7 kms. per sec. required to leave the earth's atmosphere. It is claimed for the device, that it burns all known hard alloys, ceramic and refractory materials, and that tests have proved it capable of drilling the hardest rocks much faster than a thermal drill.

Moscow News also reports that the Russians have designed and built a unique machine, which eliminates all manual labour in the pits, and that this has now successfully undergone test in a mine in the Donbas.

This machine, which is operated by one man, stationed at the control panel, is described as "combining elements of a coal cutting and loading combine, a conveyor, and a propping machine". Coal cutting along the whole length of a drift (about 20 metres) and loading on to the conveyor are done by means of a chain fitted with a set of powerful cutters. As the combine moves along, it automatically props the roof. All operations are simultaneous. According to the report the machine can cut in three hours as much coal as could be turned out in two 6-hour shifts by a mine of average capacity with ordinary equipment.

A Tass Agency report states that a walking excavator being designed at the Urals Heavy Machinery Works, in the U.S.S.R. has a bucket of 50 cubic metres on a 125-metre boom and will be able to excavate to a depth of 600 m., removing no less than 18,000,000 cu. m. of earth per year. If the 17 men required to operate it were to work by hand, the same task would taken them about 2,000 years. The same works are already producing a walking excavator of new design with a bucket of 15 cu. m. on a 90 m. boom.

A new mining machine which does all labour-consuming operations in the preparation of drifts for manganese mining has been built recently at Dnepropetrovsk, in the Ukraine. The machine is designed for heavy duty in the mines of the Nikopol manganese ore basin. It will break up rock, clear it away and load it into trolleys, and at the same time put up concrete props. In one month this machine prepares 600 metres of drift.

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Mining Methods and Practices at the Chino Mine

HE Chino mine — oldest of the large copper mines in Western United States — is at Santa Rita, in the Central mining district of Grant County, New Mexico; the concentrator and smelter are at Hurley, approximately 9 miles from the mine.

When the possibility of an open-pit mine at Chino was conceived, hundreds of feet of shaft and underground workings had already been completed. Information from these workings was augmented by information from churn-drill holes. At the start, these churn-drill prospect holes were spaced 100-ft. apart and were sampled at 3-ft. intervals. Later the spacing was increased to 200 ft. and the sample interval to 5 ft. Because of the broken and fractured ground, sampling with churn-drill holes was difficult. After experimenting with diamond drills, it was found that a good core recovery could be obtained by careful operation — even in soft ground. A total of approximately 360,000 ft. of churn-drill-sample hole and 150,000 ft. of diamond-drill-sample hole has been drilled to delimit the orebody.

At the Chino mine development and mining are essentially the same. After the decision was made to develop the orebody by an open-pit method, two separate pits were started. Mining has been discontinued in the north pit, which is now used only as a reservoir for surge water from summer storms. This water is employed for the waste dump leaching operations, which are a notable development at Chino. No dump area has been completed yet, but it has been estimated that the ultimate recovery of copper in the dumps will range from 60 to 80 per cent.

Approximately 22,500 tons of ore and 45,000 tons of waste are mined from the south pit per day. The pit is circular and about 5,000 ft. in diameter.

After the end of World War II the south pit had reached a point where lateral development was essential. Additional exploration drilling had indicated ore N.W. and S.E., so plans were made to expand the pit along this axis.

Drilling and Blasting

Holes bored by pneumatic percussion drills are used for about 4 per cent of the primary blasting. Often a combination of toe hole and crest hole is employed. Crest holes are drilled with a churn drill or with a wagon drill. Toe holes have been drilled with a tripod drill in the past. This tripod has a long carriage with two legs mounted on the front and one adjustable leg on the rear.

A rubber-tyred mobile drill has been assembled in the company shop. This machine consists of a standard rubber-tyred tractor chassis on which has been mounted a 315 c.f.m. rotary air-compressor, a hydraulically operated jumbo, and a water tank. A 4-in. bore drifter-type drill is mounted on a 12-ft. carriage at the end of the jumbo. Sectional steel is used; the 12-ft. carriage permits using 10-ft. rod sections and couplings. A $2\frac{3}{8}$ -in. tungsten carbide insert bit is used. No change in guage is made for a 20-25-ft. hole.

The average toe- or crest-hole shot at the Chino mine contains approximately 8 holes. Drilling assignments may be two miles apart. The machine is operated by two men, one of whom is also a qualified powderman who can load and blast the holes, as drilled, if the occasion warrants. A major economy of the machine lies in the ability to move compressor, drill, water, tools and men as a unit. The machine has been operated only a short time, but has drilled 2,950 ft. of $2\frac{3}{8}$ -in.

This article is abstracted from a paper by W. R. Hardwick entitled "Open-Pit Mining Methods and Practices at the Chino Mines Division, Kennecott Copper Corp., Grant County, N. Mex.," published by the U.S. Department of the Interior as Bureau of Mines Information Circular 7837. The paper is one of a series being prepared by the Bureau of Mines on mining methods, practices and costs in various districts

dia. hole at a rate of 116.2 ft. per shift. During the same period 11,712 ft. of hole 3 to $1\frac{7}{8}$ in. dia. was drilled by conventional machines at a rate of 71.9 ft. per shift.

Regular bankblasts at Chino consist of 1 to 60 holes that are blasted as a unit. Each hole is carefully measured, and the burden on the hole is computed. The height of bank is determined by using the measured slope distance from the crest opposite the drill to the digging grade below at an angle of 45 deg. A light wooden triangle held with one leg level assists the man holding the top of the tape to direct the man on the bench below to a point that is suitably located. The slope distance, the distance from the bottom point on the slope to the hard toe, the distance from the drill hole to the crest and the distance to the next and to the last drill hole are measured.

Each powder foreman carries three tables in a pocket notebook. Knowing the slope distance, he can read the bank height from the first of his tables. Since the altitude and base of the triangle are equal, the powder foreman can then subtract the measurement distance T from the height of the bank and get the measurement T1 which, added to the measured distance C from the crest to the hole, gives the measurement $T_1 + C$ (see illustration). This is the distance from the hard toe to the hole at the bottom. The second table is prepared, assuming that the section to be broken is a parallelogram. A separate page is made for each bank height; it tabulates the dimension $T_1 + C$ in the left column and various burdens for the different hole spacing in the columns to the right. The powder foreman then can look down the left column, find the particular T₁+C for the hole that he is loading, move across the page until he comes to the column showing the correct distance between holes, and read the burden directly from the table.

The third table carried by the powder foreman has the burden in the left column and the number of 50-lb. boxes of powder required for various loading factors listed across the page. The loading factor varies in different areas of the mine and is generally specified by the general drilling and blasting foreman for the area of the blast. Thus computation of the powder charge in each hole is reduced to the process of making some simple measurements and reading the charge directly from the tables.

When the holes are drilled they are made 7 to 10 ft. below grade. When the loading foreman measures the depth of the hole it usually contains some caved material. If the hole still is deeper than the required depth for loading, it is filled as required. A double lead of plain Primacord first is tied around a 6 - 10-lb. rock and lowered to the bottom of the hole. One or more 50-lb., 10-in. x 16-in. cartridges of Amogel dynamite are dropped to the bottom of the hole for a primer. To allow the wrapper to burst easily on impact and the powder to expand and fill the hole tightly at the bottom, the wax paper of the cartridge is split in several places with a sharp pocket knife. When the hole is dry, 50-lb. bags of Carbamite are used to complete the charge. The holes are then filled to the surface with stemming. A single trunkline

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of plain Primacord is run the length of the blast, the double leads from each hole are connected, a No. 6 or No. 8 blasting cap is connected to each end of the trunkline of Primacord, and the blast is fired through lead wires by a 30-cap blasting machine.

Powder is delivered to the magazine by rail. A new magazine for storing powder has an unusual safety feature. Thick, concrete walls are made with a very weak concrete mix. It is believed that should the powder explode, these walls would crumble to fine sand. The walls are thick enough to prevent effectively rifle bullets from penetrating and provide excellent insulation.

The present blasting practice at Chino mine resulted from much test work. The lack of uniformity in the rock adds to the difficulties. Beds of friable and easily broken material alternate with hard quartzite. The shovels at Chino clean up a cut approximately 55 ft. wide. Bank blasting is designed so that this area will be filled by a blast that does not cover the track, yet will break back far enough to allow the track to be shifted 45 ft. Another cut can then be taken with the shovel reaching all the broken ground, so that the bank is faced up for the next blast.

Because drillholes are spaced along the edge of the bank in straight lines, they are at varying distances from the irregular crest. The spacing is so arranged that the ratio of the toe to bank height is about 0.8, the average horizontal spacing of the holes being approximately one-half of the bank height. The use of 124-in. holes has resulted in less drill-hole footage, a saving in loading time, and better fragmentation.

Loading and Transportation

Ore and waste are loaded with full-revolving, heavy-duty electric shovels. Nine production shovels are available. The linear distance of working benches from which daily tonnage is loaded is approximately 9,000 ft., of which 3,500 ft. is ore. Shovel repair requires a crew of 10 men, who work under

the supervision of the shovel-repair foreman. Where possible, unit assemblies such as dipper, dipper sticks, boom, motor generator set, and so forth, are changed, the shovel being returned to service while the defective part is repaired in the shop.

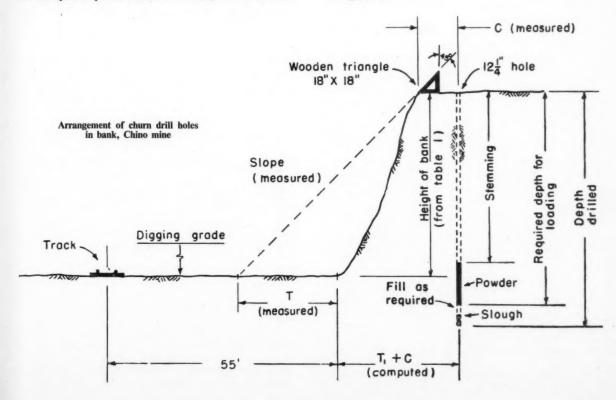
The outside dipper sticks are considered superior; replaced booms will be of this type.

Waste is hauled an average of 5.9 miles in side dump cars. There are 40 cars of 30 cu. yd. capacity and 47 cars of 40 cu. yd. capacity in use. As the former wear out, they are replaced by the larger cars. Two powerful pistons on each side permit the car to be dumped in either direction. About 30 of the larger cars have been equipped with roller bearings, as will also be all new cars purchased. Existing friction type bearings will be replaced by roller bearings when the car is sent to the shop for a major overhaul. Cast steel side-frame and rubber- or steel-draft springs are used.

Ore and waste trams are pulled by 85- or 125-ton electric locomotives over a track with an adverse grade of 2.1 per cent, compensated for curves. Because of heavy traffic, grade and sharp curves, the wear of the rail is high. Ordinary rail must be changed every six months in some congested areas. Experiments are being made with hardened rail.

Truck haulage is maintained as an auxiliary method of transporting ore and waste to augment rail haulage in special situations. Normally 25 to 27 tons is hauled in a truck load. The ore cars hold 70 and 90 tons.

Haulage roads were formerly sprinkled with water to prevent dust, but are now graded and treated with Norlig solution, a by-product of the paper industry. This solution has been effective in holding down dust. It is diluted and sprinkled on the roads; a tough crust forms on the surface of the road and little further attention is required. However, the Norlig solution is quite soluble and must be applied again after several periods of hard rain. Tests by Chino's metallurgical department indicate that this dust-controlling agent will not adversely affect the recovery of the copper in the concentrating process.



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Revival in Silver Mining at Cobalt, Ontario

STABILITY of world silver prices and the consistent increases in consumption are factors behind the sustained revival of old silver properties in the Cobalt district of northern Ontario. With a productive life spanning a half century, the camp's old silver mines are being revived at a faster pace these days. New exploration programmes are being conducted throughout Cobalt and the neighbouring Gowganda district in attempts to seek out new deposits and cash in on world prices.

Cobalt claims rather a soft spot in the hearts of eastern Canadian mining men as it was the wealth from these mines, following the turn of the century, that eventually placed other districts on the map. Wealth from Cobalt fostered prospecting programmes that located the Kirkland Lake and Porcupine gold areas. Accumulated wealth from these mines eventually financed the development of north-western Quebec gold districts and helped bankroll the famous iron ore developments of New Quebec, Labrador, Ungava, etc.

Old and new developers of Cobalt and Gowganda are still seeking the sources of the rather sensational native silver and high-grade ore that have been won from these mines. Certain success can be reported, but most developers are content to find a constant source of mill feed and, perhaps, pick up some high grade along the way.

These old mines of Cobalt have a habit of petering out from time to time but, fortunately, persistence and a good smell for ore manages to keep several producers operating after a good half century of discovery.

Canada's silver producers naturally are overjoyed that world consumption has comfortably exceeded world production for the past 10 years. This, together with a stable price, has made the silver hunt more attractive. So far, however, few new strikes have been made and most prospectors and developers have been forced to concentrate pretty well on one district, namely Cobalt.

The principal portion of Canada's silver production (the third largest in the world—31,000,000 oz. in 1958) is derived from base metal operations in the Yukon, British Columbia, from the Cobalt and Gowganda districts, and from base metal and gold operations throughout other parts of Canada. Productivity of the Cobalt district is currently centred around the many properties controlled by Agnico Mines and from the odd lessor shipping high grade to the Temiskaming Laboratories for treatment. North-west, however, Siscoe Metals (Ontario) and Castle-Trethewey Mines (the McIntyre Porcupine subsidiary) are continuing to mill regularly in the Gowganda district.

In the year to date there has been a considerable increase in claim stakings in the Cobalt district, with main efforts concentrated south of the town limits. Renewed activity is attributed to the opinion that the world price of silver is going higher. This opinion appears to bear some foundation in the fact that the United States Treasury surplus has been dwindling rapidly. In fact, the United States Treasury was forced to buy silver on the open market last year and is assumed to be doing the same this year on a large scale.

Although a 50-year productive record has been established by Cobalt there has been little scientific exploration conducted



The Agnico Mill

in the camp. Recent stakers are now forced to use aerial electromagnetic and resistivity methods for seeking out favourable structures. The day of the surface outcrop has long passed. Originally, the mines of Cobalt were considered to be fairly shallow in relation to the deep seated gold ore bodies of the Kirkland Lake and Porcupine mines. However, at the Agnico mine recent development has led to the theory that silver can carry deeper; and where the flat lying diabase has altered to a vertical position ore has been found to come in again.

Agnico Mines is currently conducting underground operations at the Agaunico, the Christopher, the Foster and the Nipissing-O'Brien Mines, all founded many years ago. Other old workings are controlled and activity will be regenerated if and when the need arises to find additional sources of mill feed.

Deer Horn Mines has dewatered its old workings in preparation for an extensive reinvestigation of old stopes. United Cobalt Mines has leased the old King Edward property for a new test of workings from the rehabilitated adit level. There's a 125-ton daily capacity mill on the property and in shape for resumption of production.

Castlebar Silver & Cobalt Mines, an undertaking of the J. H. Hirshhorn interests, is continuing diamond drilling a prospect in the Gowganda area. The company also recently acquired new acreage in the Shonia Lake area, some 140 miles north of Sioux Lookout, following the completion of an aerial magnetometer and electromagnetic survey. This ground will be probed by drills also.

Back in the overall Cobalt district Realm Mining Co. optioned new ground for an exploration undertaking. Murray Mining Corp. has completed a resistance survey. Langis Silver & Cobalt Mining has received encouragement from its recently reactivated programme on its holdings.

Silver Miller Mines, forced to suspend milling operations a short time ago due to lack of ore, is continuing an active exploration programme underground in an effort to locate additional sources of mill feed.

Other interests are exploring holdings in new and old sectors surrounding the Cobalt district and judging by the extent of general activity it would appear Ontario will continue as a prime source of the white metal for some years in the future.

By CLAUDE H. TAYLOR

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The Future Pattern of Aluminium Production

So far, the location of aluminium plants has been largely determined by availability of power in sufficient quantities at reasonable cost, and by market accessibility. Power supply continues to be a dominant factor in siting aluminium plants, but adjacency to consuming industries is becoming more important. Great power availability at low cost seems to point to the rapid development of aluminium industries in Africa in the 1960's. There is an increasing tendency to locate alumina plant in close relation to bauxite supplies — this seems to be the general pattern in the immediate years ahead.

An important factor appearing on the horizon is the utilization of other aluminous materials as the basis of the industry. Nepheline, alunite and even sillimanite and kyanite are already in use in Russia, but these are of significance only to plants adjacent to where they occur. However, from the work at Anaconda, it seems clear that high alumina clays will become of increasing importance. Of course, suitable clays may not be so widespread as many imagine, nevertheless they will enormously extend, in amount and distribution, the material on which the industry is based. It may mean that supplies of suitable alumina-bearing material will become domestically available to virtually all countries.

When that degree of availability of raw materials is reached, power at reasonable cost will become a determining factor in making possible the use of such local clays. There is no alternative power in sight to match the low cost of the hydroelectric projects in Africa and British Columbia—costs as low as the equivalent of 0.1d. per k.W.h. ranging up to 0.2d. per k.W.h. have been quoted. Nevertheless, present power costs in the U.S. and Europe, of the order of 0.4d. to over 0.5d. per k.W.h. at the reduction works, demonstrate that other factors—freight, reagent and other treatment costs, market nearness—may compensate higher power costs. It may also be anticipated that those countries which may lack hydroelectric and present thermal power resources will turn increasingly to nuclear power.

Clearly, it will be a matter of logistics (to accept the modern usage of an old army term) in determining the development of an aluminium industry in any country — of balancing the numerous factors relating to raw materials resources (reserves, grade and amenity to treatment, whether they be of bauxite, clays, nepheline syenite, or alunite, etc.), new techniques, water supply, freights, power, reagents, labour, accessibility to tide water, adjacency to markets, overall consumption, etc., not forgetting capital

By Dr. J. A. DUNN This is the last of three extracts from a paper presented at a symposium held in Brisbane on July 16 and 17, 1959, by the Australasian Institute of Mining and Metallurgy, Southern Queensland Branch, the Australian Institute of Metals, Brisbane Branch, and the Royal Australian Chemical Institute, Queensland Branch

requirements, taxation, and the general financial environment of each country. But inevitably, as the raw materials become more readily available to individual countries, simulating the distribution of iron ore, the pattern of production and marketing will approach that of iron and steel — each country will endeavour to become self-sufficient as far as possible in aluminium to the limits of finance and know-how which may be available to it. That picture is beginning to emerge, and I predict that it will become dominant by the 1970's.

An important point in expansion of aluminium usage is price. Despite some low cost power developments, as in Africa, such projects will have other adverse cost problems. On present techniques I cannot see any long term reduction in price. Maybe from time to time there will be severe competition from Communist aluminium, but Communist producers will have their problems too, and in the long term they will not greatly affect price. The long term price trend will be upward, but so also will be that of other competitive materials, and in the years ahead, with its abundance of raw materials, aluminium is unlikely to be under a competitive price disadvantage.

Outlook for Australian Bauxite

To what does all this point in the development of Australian bauxite deposits? It is clear that there is no permanent market for our bauxite in Europe, nor in the United States as one can see it at present. Maybe, in competition with Indonesia, Malaya and India we might find some market for a certain amount of bauxite in Japan.

Within the space of the 1960's I can see no market for Australian alumina in Europe — unless political problems in Africa were to inhibit or delay the development of the larger projects there. If that were to happen, there may well be some European market for Australian alumina in the latter part of the 1960's and early 1970's, but it could well be competitive with alumina from the Caribbean and perhaps from India and even Communist countries.

Turning to North America, however, an alumina market on the west coast seems to be a reasonable possibility. Australian alumina may well prove competitive in supplying this American Pacific coast market, taking into account Panama dues on Caribbean alumina and rail freights between alumina plants at U.S. Gulf ports and the North-west States. My guess is that such market will be limited to those companies which may acquire linked investment in Australian alumina production — so far, Reynolds Metal Co. is a possibility. Whether Alcan, following their prospecting in the North, will establish an alumina industry here to serve the Kitimat plant remains to be seen.

The establishment of an aluminium reduction plant in

Australia, with the intention of entering the international market, will be in the minds of all of us. From the earlier part of this address, it will be apparent that existing world capacity and new projected capacity will amply take care of world requirements up to the late 1960's and perhaps into the early 1970's. There is little possibility of Australian metal entering into world industry in a big way during that interval. Thereafter, Australia's competitive ability will depend partly on the extent to which African projects, based on African bauxites and low-cost power, can be developed. Political stability and capital availability will perhaps be the deciding factors - political stability is in Australia's favour. But, apart from African developments, by that time I would foresee the pattern of distribution of reduction plants changing, the use of new raw materials and new power sources leading towards more widespread self-sufficiency in aluminium production in each country.

Although I would regard 1970 as the approximate target date towards which we might be thinking of pushing into world aluminium markets, it seems to me that, as the years go by and despite the vastly increasing world demand, the problems are not likely to be lessened, they may well become greater — internationally, time is not on our side over the longer term.

As I see it now, the obvious scope for aluminium reduction in Australia is the domestic market itself. In 1959, Australia requires just on 30,000 tons — well in excess of Bell Bay's capacity, 13,000 tons, which has not so far been attained. Our consumption per head is amongst the lowest of western countries; to be comparable to West European countries and Canada, Australia's consumption should at present be 40,000 tons a year, and to be comparable with the U.S. it would be 80,000 tons. The per capita rate of consumption is forging ahead everywhere in the world. Aluminium marketing has not until recently been vigorous here, there is great scope for further usage development, particularly in construction, transport and consumer goods. Given the drive — on a par with

the drive in America in the past ten years — and a rate of increased consumption comparable to that expected for the world as a whole, a rise of consumption in Australia to 100,000 tons annually by the 1970's would not be out of balance.

Bell Bay production is well back in the race with domestic consumption. Plans to expand production, if only to the extent of the available alumina capacity at Bell Bay, will not close the gap with rising consumption. Whether power availability, cost and marketing problems would permit the adequate development of Bell Bay will be clear to the group who made the recent survey there. The construction of an entirely new plant for additional demand may well be warranted. But whoever goes ahead with a larger reduction plant in the future in Australia must play a leading domestic role in fabricating, and in market development. Vigorous expansion of the market may be further implemented following vertical integration of the industry — this has been amply demonstrated by the major producers overseas.

The immediate objective could well be the initiation of such a plant, aiming to lift capacity to 100,000 tons by the 1970's. Maybe, before then, the next target will be clearer, and the industry would be well established to enter rapidly into international markets should the opportunity offer.

In the meantime, the national programme should be as flexible as possible. Administratively, the chance of taking advantage of whatever market may become available for bauxite or alumina should be kept wide open. Each market step gained alleviates in some way the problems of full development. At this stage, any precise programme committing development to a particular timetable and scale of investment would be inadvisable and, indeed, could well inhibit the raising of essential finance. The capital requirements will be great — of the order of £100,000,000 for plant up to the capacity mentioned. Taxation amelioration may well be an important factor in such development.

Madhya Pradesh Coal Mining Project

Specialists from Leningrad have completed the design for an Indian opencast coal-mining enterprise with an annual capacity of 2,000,000 tons of fuel, reports our Indian correspondent. This design for one of the biggest enterprises of India has been drawn up under a contract concluded between the Technoexport and Import Organisation of the U.S.S.R. and the National Coal Development Corporation of India Ltd. The new enterprise will be set up in Madhya Pradesh at the Korba coal deposits where a valuable coal seam up to 30 metres thick lies at a depth ranging from 5 metres to 180 metres. Reserves in this deposit total 80,000,000 tons.

Coal will be worked at two sites at various levels. Production will be almost completely mechanized. It is anticipated that this will result in labour productivity equivalent to over 400 tons a month per worker.

Coal will be delivered to a concentration plant also designed by Soviet engineers. The Soviet Union will also deliver mining equipment and design large mining and transport machinery repair shops.

Meanwhile, about 30,000 tons of coal are expected to be mined during the current financial year at Junglegali and Kolakote coal mines in Jammu province. The lignite mines at Nichahama in Kashmir are being mechanized.

Coal Mine on the Roof of the World

A fuel problem on the roof of the world, in Tibet and adjacent China, is presented by the opening up of an opencast coal mine in the Kulun mountains which will be able to supply the needs of new factories established along the highway running along those mountains, from Sining to Lhasa, and of the Tsaidam oilfield, in Chinghai, China.

The revolutionary character of this development is evident when it is realized that the word "coal" did not exist in the vocabulary of the local Tibetans, who used yak dung as their fuel, for domestic purposes, since there are no trees to provide them with wood. With the opening up of the new highway in 1954, however, and the subsequent establishment along it of farms and factories, the need for something better than yak dung became urgent, and in the following year workers from these farms and factories located this coal, in an area where it was believed that none existed, and since then have been working it as needed to meet their requirements. Output there is expected to reach about 35,000 tons next year.

The working of coal at somewhere between 13,000 ft. and 16,000 ft. above sea level presents obvious difficulties. The 107 miners engaged in the project working well above the snow line, have to be provided with protective clothing, whilst the rarefied atmosphere provided labouring difficulties.

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A New Compressor Unit

New to the range of Holman stationary air compressors is the Duplex compressor unit designed for permanent installation where large quantities of compressed air are required. This compressor unit, manufactured by Holman Brothers Ltd., comprises a centrally mounted electric motor of 156 or 230 b.h.p. fitted with a driving shaft extension at each end to which are coupled two Holman T.60R or T.36R compressors. The drive is effected through either flexible or centrifugal couplings, depending upon the type of motor and control gear employed.

A unit comprising two T.60R com-

A unit comprising two T.60R compressors produces 1,050 c.f.m. at 100 p.s.i. and is suitable for operating at pressures up to 150 p.s.i. with an operating speed of 720 r.p.m. Alternatively, 610 c.f.m. at 100 p.s.i. is produced by two T.36R compressors operating at 1,000 r.p.m. This unit is also capable of operation up to 150 p.s.i.

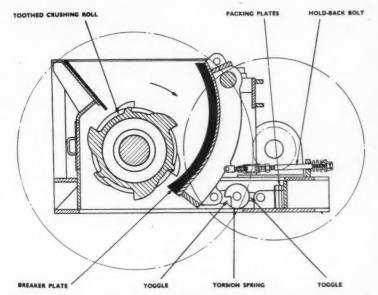
The compressors used are Holman two-stage design reciprocating type compressors. Automatic control equipment limits actual running time to the period for which compressed air is required. Where a number of sets are in operation, selection equipment can be provided to ensure an even loading cycle, thus preventing continuous maximum loading of any one unit.

any one unit.

An air blast aftercooler, where exceptionally cool, dry air is required is recommended for use with the unit, and is particularly effective. In common with the compressor it does not require an external source of coolant and the motor can be electrically interlocked with that of the compressor. An unloading pilot valve can be set to unload delivery at any pre-determined pressure thus ensuring safe operation at all times.

A relief valve on the oil nump cover

A relief valve on the oil pump cover enables the pressure in the oil system to be controlled. On the T.36R the low



The crushing zone and means of adjusting the Pennsylvania Hercules single roll crusher

pressure and high pressure cylinders and valves are lubricated by a visual drip feed lubricator, whilst on the T.60R, they are lubricated by a sight feed lubricator driven by the gearing on the end of the crankshaft. Both types of lubricators can be regulated to give the necessary amount of oil.

The Duplex compressor unit, employing two T.60R compressors, is 192 in. long, 43 in. wide and 73 in. high and weighs 17,000 lb. The T.36R unit is 152 in. long, 35 in. wide and 58 in. high and weighs 10,000 lb.

CRUSHER FOR NEWFOUNDLAND

The Fraser and Chalmers Engineering Works of The General Electric Co. Ltd., have recently supplied a single roll crusher, 60 in. wide x 30 in. dia. roll, to Atlantic Gypsum Ltd., Corner Brook, Newfoundland, for the reduction of gypsum rock in their quarry at Flat Bay, Newfoundland. The machine is made under license from Pennsylvania

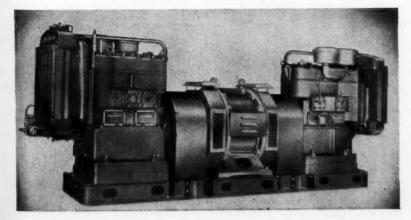
Crusher Co. and is the largest of the new Pennsylvania Hercules mediumduty range. It is capable of breaking 36 in. lumps of gypsum rock down to 5 in. size or under at the rate of 400 tons per hour. The toothed crushing roll is driven at 40 r.p.m. by a 250 h.p. G.E.C. slip-ring motor, running at 700 r.p.m., through V-belts and gears.

Both the frame of the crusher and the breaker plate have been designed for all-welded construction, and the whole crushing zone is protected with liners of special steel. The breaker plate is held in position by means of a spring-loaded holdback bolt in conjunction with two toggles, one on each side of the frame, each toggle being kept in the fully extended position by means of a torsion spring. This combination serves to protect the moving parts against breakage in the event of tramp iron or other uncrushable matrial getting into the feed. At the same time it provides a quick method of adjusting the setting of the breaker plate, which regulates the size of the product.

To adjust the breaker plate, the hold-back bolt is locked with a pin and the plate with the toggles is moved forward by means of a turnbuckle on the bolt. Packing plates of the required thickness are dropped into place behind each of the toggles, or taken out, as necessary, and the turnbuckle is then turned in the reverse direction until the rear ends of the toggles are hard up against the packing plates. The pin is removed from the holdback bolt and the spiral spring at the free end is adjusted, if necessary, to slight compression. The machine is then ready to resume crushing, the whole operation having taken only about five minutes.

In the event of tramp iron entering the crushing zone, the breaker plate retracts against the torsion springs, forcing the toggles upwards, and allows it to pass through. The torsion springs return the plate to its normal position when the tramp material has been cleared, the backward movement being cushioned by the spring on the holdback bolt.

The new Holman Duplex compressor unit



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MINING MISCELLANY

The Spanish Official Bulletin has published a decree liquidating seven organisations following the reforms recently adopted to liberalize the Spanish economy. These organizations, which must be closed down within the next twelve months, include: The Board of Price Control (which regulated internal prices), The Council of Special Minerals of Military Interest (which permitted the Government to participate in the exploitation of mines of strategic interest); and the three funds for controlling prices of hard fibres, zinc and tin.

A project for setting up a lead and zinc smelter in Peru is reported to be under examination by the West German Ministry of Economic Affairs. A Government-sponsored technical aid commission, which spent May and June investigating conditions in Peru, supplied a report on the project.

The Dutch Economic Ministry and State Mines Board will hold discussions soon on whether to continue or abandon work on the Beatrix mine near Heerlen, in South-east Holland. The 500 m. shafts of this large new mine have already been sunk and some 20,000,000 guilders have been invested in the project. It was due for completion in 1962, at a cost of 200,000,000—300,000,000 guilders, to give employment to more than 5,000 people.

Dra. Blanca G. de Wappner, fluorescent X-ray analyst for minerals for the Atomic Energy Commission of Argentina, and Miss Maria H. Falabella, of the National Nuclear Energy Commission of Brazil, are

completing unusual tours of training with the U.S. Department of the Interior's Geological Survey. Their objectives are to improve their own X-ray diffraction and fluorescence techniques for the analysis of minerals as employed in South American laboratories and to learn the basic data, theory and ways of applying new methods.

A fifth pumping station has been put into operation at the Dead Sea Works in Sodom, as a result of which the three new evaporation pans in this potash plant can now be utilized. The new pans, completed in record time following the decision to build them taken in December, 1958, cover an area of approximately 1,750 acres. They can hold some 10,000,000 cu.m. of sea water and will add about 40,000 tons of potash to the annual production capacity of the plant.

Johns - Manville Corporation has acquired F. E. Schundler and Co. Inc., of Joliet, Ill., U.S.A., a producer of perlite. Johns-Manville expects to use perlite in the development of new products, and to supply crude perlite to industry.

At the annual meeting of the British Newfoundland Corporation, the chairman announced that negotiations with Labrador mining interests may result in a subsidiary company's power development scheme on Hamilton River at Twin Falls, where 50,000 to 300,000 h.p. could be developed. Wabush Iron Co. would take some power, but the size of the project would depend on demand when construction began. A subsidiary, British Newfoundland Exploration had found several new mineralized

areas under favourable geological conditions, including occurrences of asbestos fibre and copper in Labrador and copper bearing and lead and zinc mineralization in Newfoundland.

Aluminium Union Ltd. has, with effect from October 1, changed its name to Alcan (U.K.) Ltd. Aluminium Union Ltd. has for many years been the United Kingdom distributing company for the aluminium ingot and magnesium, bauxite and chemicals produced by its associated companies in Aluminium Ltd. of Canada.

PERSONAL

The Hon. Paul Jones has resigned as a director of Morning Star (G.M.A.) Mines N.L.

Mr. William Schreiner Findlay has been appointed director and deputy general manager of Johannesburg Consolidated Investment Co.

Mr. Charles Fox, partner in Daniel C. Griffith & Co., Assayers to the Bank of England retired from the firm on September 30, 1959, after more than 52 years service. Mr. Alastair R. Griffith, a great-grandson of the founder, became a director on October 1. The business will be carried on as before with the same technical staff.

Mr. C. W. Boise retired from the board of directors of Selection Trust, Ltd., Consolidated African Selection Trust, Ltd., and Seltrust Investments, Ltd., on September 30, 1959. Mr. Boise has been associated with the Selection Trust Group of Companies, of which he was one of the founders, for 37 years.

Dr. Joseph L. Gillson, chief geologist of E. I. Du Pont de Nemours & Co., has been elected president for 1960 of the American Institute of Mining, Metallurgical and Petroleum Engineers, and will take office at the annual meeting to be held February 14-18, 1960.

Mr. William S. Findlay has been appointed a director and deputy general manager of Johannesburg Consolidated Investment Company.

The Dow Chemical Company has elected Mr. C. B. Branch and Mr. Donald K. Ballman, two of their directors, to be vice-presidents of the company.

Mr. A. H. Thomas has been elected president of the Purchasing Officers Association for 1959/60.

Twiflex Couplings Ltd., a member company of the Sheepbridge Engineering Group, announce the appointment of Mr. D. Pooley as their Southern Area Engineer.

Mr Douglas Smith was appointed general manager of the Fibre Division of British Ropes Ltd., during the latter part of last year, and now Mr. E. D. Nicholson and Mr. Stuart Watts have been appointed general managers of the Wire, and Wire Rope Divisions respectively. Mr. Watts also joins the board of the company. Mr. Nicholson relinquishes his post of company secretary on his new appointment, and is succeeded by Mr. J. R. K. Buckley.

Richard Sutcliffe Ltd., announce the appointment of Mr. Matthew Reid Moore as manager of their Mining and General Products Division.

An additional Sintering Plant is to be supplied by Head Wrightson Iron and Steel Works Engineering Ltd., a subsidiary of Head Wrightson and Co. Ltd., to the Aviles works of Empresa Nacional Siderurgica S.A., the Spanish national steel company. The new plant will form an extension to the existing sinter plant and is designed to produce an additional 10,000 tons of blast furnace sinter per week. The total value of the equipment to be supplied is approximately £500,000. In laying out the original plant, provision was made for doubling the sintering capacity at some future date and it is this stage of development which is now to be completed. The illustration shows the strand of the existing sinter plant



Metals and Minerals

New Markets for Aluminium

Aluminium uses and applications continue to grow very rapidly. According to a recent survey by Aluminium News, the increase during the past decade has largely taken place in essential industries largely taken place in essential industries which supply such basic services as shelter, transport and communication. The various applications for which the metal is used vary greatly from one country to another. In the case of the U.S., which may be taken as a good example of a highly industrialized country, major end-users are estimated as follows: major end-users are estimated as follows: Building and construction 21 per cent; transport 19; household and commercial appliances and equipment 12; electrical industry 11; industrial equipment 8; and canning and packaging 5 per cent.

The confidence of aluminium producers in the immense potentialities for future market development is indicated by Alcoa's initiation of a planning programme for a multi-million dollar research and development centre claimed to be without precedent in the world's metal industries. Work on the first installations will start within a year on a 2,400-acre tract at Merwin, Pennsylvania. More than \$30,000,000 has already been allocated for the project, but ultimate costs are expected to be much larger.

Alcoa, which is spending more than \$1,000,000 this year in research and marketing development in the residential building field, expects that an average of 1,000 lb. of aluminium will be used in 1,000 lb. of aluminium will be used in every new American home by 1965. If a million homes were built per year, this would require 500,000 tons of aluminimum for new homes alone, or more than the entire building industry—aluminium's largest single market—will consume this year. It is estimated that 56 per cent of 1959 sales by a major pre-fabricated home builder will be in aluminium-skinned houses, a proportion which is expected to rise to 70 per cent next year. next year.

next year.

Also noteworthy are Alcan's plans to construct, at a cost of nearly \$600,000, a continuous coating line for the production of painted aluminium sheets and coils, as an addition to its sheet mill at Kingston, Ontario. The new installation will enable the company to offer aluminium sheet in a wide range of baked enamel colours. The decision to proceed with the new facilities was prompted by increasing demand for colour in a wide variety of existing and potential applications. The paint line is scheduled for completion next year.

Among the most interesting developments is the invention of a process for aluminizing clothing fabrics, which could keep heat in or out. This invention was described by Mr. W. H. Rees, senior research officer at Shirley Institute, Manchester, who saw no reason why wool, nylon, cotton, or indeed any fabric should not be woven with aluminium, which, as used, was only 4,000th of an in. thick It should add little to the cost of clothing. The invention has been patented as the Shirley metallized fabric. One firm is taking it up and the Ministry One firm is taking it up and the Ministry of Supply is understood to be showing interest.

It is further reported that aluminium strip is about to make sizeable inroads into the electro-magnetic coil field, long dominated by copper wire. Since Sep-tember, 1958, Alcoa has been making strip-wound coils in its research labora-tories' transformer division. The company stated that current activities by over a dozen coil makers indicate that the aluminium-strip wound coils will soon become general market items.

Kaiser Aluminium, third largest producer in the U.S., has announced the setting up of a private company in U.K. to carry on its business in this country. Both the other major U.S. producers are already represented in the U.K. through link-ups with British firms. Recently it was reported that Kaiser Aluminium International had appointed sales managers to direct its selling activities and sales to direct its selling activities and sales services in the U.K., Europe and South America. They will operate from offices in London, Zurich and Buenos Aires.

An aluminium plant using a new reduction process is to be built near Pavlodan, in the north-east of the Soviet Republic of Kazakhstan. It will come into full operation by 1963. A small-scale pilot plant is planned for this year.

NICKEL'S PROSPECTS

After the end of the strike in the U.S. steel industry there will be a sharp rise in the use of nickel to make up for the many weeks of loss in melting at many alloy steel plants, states Mr. Albert W. Gudal, Lukens Steel Co. analysist, in the latest bulletin of the National Association of Purchasing Agents. In view of high inventories plus the new nickel capacity coming in, however, there is no reason to expect price increases within the foreseeable future.

Meanwhile, the nickel industry re-

Meanwhile, the nickel industry remains confident in its long-term prospects. Speaking at the annual western meeting of the Canadian Institute of Mining and Metallurgy in Winnipeg, Mr. K. H. J. Clarke, manager of Can-adian sales and market development of International Nickel, emphasized that in its increased capacity in Sudbury, in its new capacity in Manitoba, and in its greatly expanded research, market degreatly expanded research, market de-velopment and sales activities, Inco was investing heavily in the future of nickel. The company is convinced that, with greatly expanded market development and research programmes on the part of all concerned, the future can show an unward trend in pickel consumption. upward trend in nickel consumption.

The Shimura Kako Chemical Proces-The Shimura Kako Chemical Processing Co., a Japanese concern, has signed an agreement making it part owner of the Trojan nickel mine at Bindura in Southern Rhodesia. Co-owners are Anglo-Vaal Ltd., a South African mining concern. Full details have not been announced, but the agreement is understood to involve the construction by the Japanese company of a £1,000,000 nickel refining plant at Bindura. Work on the plant is expected to start next year under the supervision of 30 Japanese engineers.

WOLFRAM PRICES FALL

Wolfram ore prices fell sharply in London following the announcement on September 23 that the Board of Trade had instructed its agents, British Tungsten Ltd., to resume sales of a limited quantity of tungsten ores as market conditions permit. Prices now range from 140s.-145s. per l.ton unit c.i.f. Europe compared with 162s. 6d.-167s. 6d. previously. In New York the price has fallen to a nominal \$18.00-\$18.12 c.i.f. U.S. ports (previously \$20.62 nominal).

No sales have been made from the Board's stocks since June, 1957, because of the weakness of the market. They will now be made in the light of market conditions, no fixed period being set for disposal. No fixed rate of sales is being aimed at, nor has any specific quantity been set aside for disposal.

The resumption of sales by the Board of Trade came as no surprise to the market, following the spectacular rise in prices. However, the immediate reaction prices. However, the immediate reaction to the announcement was bound to be bearish. Although no quantity has been disclosed, the tonnage involved is assumed to be similar to that made available in 1957, namely 500 tons of metal content. The announcement came at a time when demand in the U.K. and abroad had virtually dried up. It is possible, therefore, that the market was ripe for a downward reaction in any case. for a downward reaction in any case, though the tendency has no doubt been aggravated by the Board's resumption of sales. Until the market has settled down and new business has matured, the price is generally considered to be nominal.

BAUXITE IN JAMAICA

The production af alumina will begin towards the end of this year at the new £15,000,000 plant of Alumina Jamaica Ltd., at Ewarton. Dr. D. A. Bryn Davies, chairman and managing director of the company, states that this has become possible through a "continuing though gradual improvement" in the international aluminium industry. Given favourable market conditions, full production of 250,000 tons of alumina should be reached by the second half of 1961. Completion of the Ewarton plant will bring the company's total investwill bring the company's total invest-ment in the development of Jamaica's bauxite industry to £40,000,000.

bauxite industry to £40,000,000.

Meanwhile, Alcoa is prospecting for bauxite in nearby Clarendon over an area of 50 sq. miles, as agents for Caribex Ltd., a subsidiary of American Metal Climax, which was granted a prospecting licence by the Jamaican Government in 1957. Their surveys and tests have indicated sufficient bauxite in the area to build Jamaics' fifth alumina the area to build Jamaica's fifth alumina

SIBERIAN DIAMOND DISCOVERY

According to the Soviet news agency Tass, a new diamond field has been discovered in the north-western part of Yakutia, in Siberia. The prediction is made that this field, extending for 43½

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miles, will be one of the world's biggest diamond areas in seven years' time. It is to be explored in detail next year.

The Executive Board of the Sierra Leone Government Diamond Office met in London on September 25 and reviewed the progress made in establishing the new marketing system. Certain changes to improve the procedure of purchasing diamonds at the Government Diamond Office were agreed. It was noted that up to September 23 the total purchases for the month through the legitimate market amounted to £520,800, which is a vast improvement on any previous purchases at this time of year.

The government buying office was established by means of a new Agreement announced earlier this year, which covers a period of five years from August 1, 1959. In terms of the Agreement, details of which were given in our issue of June 26, p. 702, the government diamond office is the sole legitimate exporter of diamonds produced in Sierra Leone under the Alluvial Diamond Mining Ordinance.

Gem diamonds worth \$2,000,000 are to be taken from two secret U.S. Government stockpiles next February and sold by public auction or sealed bids. They will comprise cut diamonds totalling 8,397 ct. and valued at \$1,098,481, and uncut stones, totalling 47,048 ct. and worth \$1,000,000.

BISMUTH AND ANTIMONY IN THE U.S.

Consumption of bismuth in the U.S. increased 17 per cent to 355,000 lb. during the second quarter of 1959, according to the Bureau of Mines, U.S. Department of the Interior. The increase was attributed to the continuing rise in general industrial activity. For the second consecutive quarter consumer and dealer stocks declined markedly. Imports of refined bismuth fell 18 per cent to 96,000 lb. during the quarter. Shipments from Peru, traditionally the largest contributor to U.S. supply, declined to the lowest total ever recorded, effectively offsetting considerably higher receipts from Mexico, Yugoslavia and Canada.

U.S. domestic smelters produced 2,600 s.tons of primary antimony during the second quarter. This quantity was 24 per cent more than that of the preceding quarter and considerably above the average quarterly output of 1958. Mine production was 161 tons. Imports of antimony dropped 13 per cent during the quarter. Consumption of primary antimony rose sharply, the estimated total use of antimony in all products being 4,100 tons compared with 3,000 tons in the first quarter. Nearly the entire gain was attributed to increased fabrication of metallic products, mainly battery grids. Industrial stocks of primary antimony remained practically unchanged.

COPPER · TIN · LEAD · ZINC

(From Our London Metal Exchange Correspondent)

Price movements have been small during the last week but where changes have occurred, they have normally been in an upward direction. Commercial demand for all four metals remains satisfactory although that for lead shows signs of lagging behind; most other operators in the market are inactive owing to the general election in the U.K. and the strike situation in the copper industries of the U.S. and Chile.

SHADOW OF U.S. STRIKES OVER COPPER

There have been so many factors likely to affect the copper market that dealers have been reluctant to take up any definite attitude and to understand this it is perhaps easiest to catalogue the various points. The strike in the U.S. continues although there are reports that the workers are beginning to feel the pinch and would like to return to work provided they can see some benefit arising from the strike. The only concrete move to be made has been that Kennecott will meet Union officials on October 5 to resume negotiations in connection with the Garfield Smelter and Refinery and bargaining is still going on at Kennecott's smelter at Ray, Arizona. The effects of the prolonged steel strike are being more and more felt by U.S. industry and within a short time consumption of copper is bound to be affected.

The situation with regard to a longshoremen's strike in the U.S. is extremely involved, as, although the New York branch were prepared to extend the existing contract for another 15 days, the men at Gulf Ports have struck and an attempt is being made to bring out in sympathy all the long-shoremen between the Gulf and Montreal; should this strike develop, it will mean that shipments of copper from Europe to the U.S. will be hindered, but equally, the continued shipment of a small tonnage of copper from the U.S. will also be stopped.

In Chile, negotiations at Braden are continuing until the last minute and it is impossible to guess whether the strike, now scheduled for midnight Thursday, will take place or not. If it does, most observers think that the effect on the copper price in London will be noticeable. Apart from these considerations, there have been reports of more unrest in the Belgian Congo and, in the U.K. itself, the copper stocks showed an unexpected rise of 425 tons bringing the total to 13,238.

The price structure throughout the world has remained steady throughout the week although the price of dealer copper in America has tended to creep above the 33 c. per lb. mark at which the one working customs smelter is selling its output. At the time of writing, the majority opinion seems to be that the copper market may improve for a period, perhaps until the end of the year but that after that production will again overtake consumption and restocking with a consequent decline to a level at which cutback actions by the producers will once more become necessary. In this connection it is interesting to note that it is reported that the Union Minière du Haut-Katanga's production for 1959 is expected to reach 260,000, as against 235,586 last year.

TIN LOWER IN SINGAPORE

The weaker undertone reported last week continued in the tin market with prices in Singapore falling appreciably. With the beginning of the new quota period, the selling may continue for a few weeks at slightly above average tonnage and this may continue to depress the market, but support in London appears whenever the price falls £2 or £3 and it is possible that the premium established in Singapore may continue to lessen. Stocks at the end of last week rose by 34 tons to 8,594 and there is still no definite trend as to whether the market will show a backwardation or a contango.

On Thursday the Eastern price was equivalent to £810 per ton c.i.f. Europe.

WORLD LEAD/ZINC PRICES LESS AFFECTED BY U.S. INFLUENCES

The weakness in the lead market continued although quotations were not materially altered. The zinc market on the other hand, recovered the ground lost last week and the backwardation has once more tended to widen. The effects of the U.S. steel strike have still not spread to the lead and zinc industries but there are signs that this state of affairs may soon alter, in which case there may be a run on the available supplies in the U.S.

As has been pointed out before, however, the present quota system successfully isolates the U.S. market from the rest of the world except through sentiment. At the beginning of the quota period, however, the effect may be more noticeable, as those countries which normally spread their exports to America over the whole of the quota period may be tempted to rush as much metal as possible into the U.S. at the beginning of the period should there appear to be a considerable price advantage.

Should this happen, the outside U.S. price structure would show a tendency to firm up towards the end of the period.

Outside the U.S. demand for both metals continues at an even rate and supplies of nearby zinc are not easy to obtain. It would seem that the present state of affairs is likely to continue throughout the autumn and even into next spring should the U.S. Tariff Commission not make any recommendations by then.

Closing prices are as follows:

	Sept. 24 Buyers Seilers	Oct. Buyers Sellers		
COPPER Cash Three months Settlement Week's turnover	£227 £227‡ £227‡ £228 £227‡ 7,300 tons	£228‡ £228‡ £229‡ £229‡ £228‡ 9,850 tons		
LEAD Current ½ month Three months Week's turnover	£69\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	£70 £70½ £71½ £71½ 5,450 tons		
Cash Three months Settlement Week's turnover	£793 £793½ £790½ £791 £793½ 530 tons	£793\frac{1}{2} £794 £794 £794\frac{1}{2} £794 435 tons		
ZINC Current ½ month Three months Week's turnover	£851 £851 £841 £841 3,850 tons	£861 £861 £85 £851 3,850 tons		

London Metal and Ore Prices appear on page 322.

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Mining Finance

Platinums Pay Again

The week's big news for the mining markets has undoubtedly been the long awaited publication of Rustenburg's results for 1958-9, together with the foreshadowed resumption of dividends by Union, Potgietersrust and Waterval. These latter companies are the media through which the public holds its stake in South Africa's platinum, the producing company having no quotation of its own.

The average official price of platinum in 1958-9 was £24 13s. 3d., a further reduction from £27 15s. in 1957-8. In view of this, the strong recovery in profits experienced by Rustenburg might appear surprising. After providing for tax and adjustments in the stock realization reserve, the net profit was £2,950,000, compared with £796,779, permitting not only a dividend of 26s. 3d., but also the repayment of the loan of £1,000,000 made by the Standard Bank last year.

One explanation of this apparent paradox lies in the fact that the actual price received by Rustenburg was probably nearer to the official price's upper limit of £28 10s., reached in March (and since maintained), than to the average. When the official price reached

its lowest point of £19 10s. last November, Rustenburg was selling very little platinum indeed, probably little more, in fact, than the 50 per cent of 1956-7 sales that had been achieved in 1957-8. When the wind changed, however, it changed suddenly, and the cessation of underselling by Russia resulted in a regeneration of the platinum market, in terms both of activity and of prices. Thus it is probable that considerably more than one-half of Rustenburg's sales last year were made between February and August, this in spite of the recent quietness of demand, due to a reaction from the hectic trading of the spring.

As far as future demand trends are concerned, Rustenburg says that the stocks held by oil refining companies, the largest group of buyers, are probably sufficient for current needs. Demand from this sector is, therefore, at a low level. Other customers, however, have been seeking more platinum, and in particular, exports to countries other than the U.S. have been improving. Sales of platinum's associated metals—osmium, iridium, rhodium, etc—have also shown an upward trend during the year.

There seems to be every prospect of a reasonably good year to come for Rustenburg, therefore. The only uncertainty is the question of low-priced Russian offerings, which stopped unpredictably in February and, presumably, could resume just as unpredictably. The evidence, however, is more hopeful—since February, the reduced quantities of "red" metal coming on to the market have been offered at prices in line with the official selling price. Whether this represents a basic change in policy, economic necessity or expediency remains to be seen.

VAAL REEFS SMASHES SHAFT RECORD

As we go to press, news of a new world shaft sinking record has been announced by Vaal Reefs, Anglo American's rich young mine in the Far West Rand. At 7 a.m. on Thursday, October 1, the Vaal Reefs No. 2 shaft, a 26 ft. concrete lined circular shaft, reached 2,054 ft., representing an advance during the preceding thirty days of 922 ft. This compares with the previous record of 868 ft. achieved by a mine in the Don coalfield of the U.S.S.R.

The new record is all the more remarkable in that it was achieved in a shaft 4.35 ft, larger in dia, than the Russian mine's 21.65 ft. The average cycle was approximately five hours with a fastest time of 4 hrs. 30 min. An average of 7 ft, was advanced during each cycle and the best advance achieved in one day was 39 ft.

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S. RHODESIAN GOLD FOR TINTO

Rio Tinto (Southern Rhodesia) has exercised its option to acquire the capital of Leslie Gold Mines, owner of the Patchway Mine about 12 miles north of Gatooma, S. Rhodesia. The Big Ben mine, some seven miles to the east of the Patchway, has also been bought, and Rio has been granted an exclusive prospecting order over 24 square miles of nearby country.

The Patchway

of nearby country.

The Patchway mine has been milling at a rate of about 3,000 tons per month, while Big Ben has been treating "a small tonnage of high-grade ore". Exploratory work by Rio Tinto Mineral Search of Africa has been in progress for some months, and it is believed that both properties could be profitably expanded. Routine work on the area covered by the prospecting order is still going on.

TANKS DIVIDEND MAINTAINED

The declaration by Tanganyika Concessions of a final dividend of 2s. 3d. per unit, to make a virtually unchanged total of 3s.9d., will be welcome news not only to Tank's stockholders, but to investors in the "new" Kentan, whose income to a large part derives from Tanks.

Any doubts that Tanks would maintain its dividend stemmed from the reduction in the payment from its subsidiary, the Benguela Railway which

LONDON MARKET HIGHLIGHTS

For the first two days of the week the mining share market suffered from an attack of unrelieved gloom. There were no very hard and fast reasons for the mood, no alarming Press reports and relatively little selling. But buyers both in London and Johannesburg were notably absent and share prices stood no chance against even the normal small routine sales. Perhaps the reason for all this lay in the pre-election doubts that were overhanging most of the Stock Exchange.

O.F.S. issues suffered most. Free State Geduld, for instance, slid back 3s. 9d. to 173s, 9d. and Western Holdings lost 2s. to 162s. 6d. St. Helena plunged to 82s. 6d., but there was a reason for the move in reports of time-bargains maturing at the Cape which had caused some obligatory selling.

Dullness spread to the Finance section, lowering Anglo American to 197s. 6d. and Gold Fields to 81s. 3d. Diamonds fared little better and Platinums failed to derive much benefit from their dividends which were up to the very best expectations.

But on Wednesday, the cloud cleared and with the start of a new Stock Exchange Account — it will cover the election period — the Kaffir market brightened. O.F.S. issues which had borne the brunt of the setback moved ahead again as buyers found that there was not very much stock to be had after all. Several of the shares were marked ex-dividend and by the end of the day they had regained the dividend deductions. This meant rises on the day of 3s. for Western Holdings and 2s. 6d. for Free State Geduld. The star turn,

however, was provided by President Brand which spurted 3s. 1½d. to a very firm 74s. 4½d. xd. when Paris and Johannesburg demand inspired by hopes of a new record profit in the September return disclosed a shortage of shares.

Copper shares also brightened. Chartered led the way with a rise of 9d. to 91s. 3d. and Messina moved up 1s. 3d. to 110s. A really active market developed after a long period of stalemate in "Tanks" which spurted 1s. 6d. to 45s. 6d. This followed the fairly well maintained profits derived from the holding in Union Minière. Although 1958 was a difficult year for copper producers, the previous year's 6d. portion of the "Tanks" dividend which had been paid out of revenue reserves was now incorporated as part of the normal dividend. It was realized that the greatly improved prospects for Union Minière earnings this year will mean higher revenue for "Tanks" and consequently higher dividends for shareholders. And even now the shares yield over 8 per cent.

Another stock to respond to satisfactory results was the Australian lead and zinc producer, North Broken Hill. The sharp recovery in profits and a higher dividend caused the shares to rise 3s. 9d. to 87s. 6d.

The Tin group plodded along in step with the steady metal price. Southern Kinta (26s, 3d.) made no reaction to the satisfactory dividend and profits, but there was some persistent London support for Kinta which rose 1s. to 22s. Beralt (31s. 6d.) inevitably suffered after the reaction to the hectic rise in the wolfram price.

The

had a somewhat difficult year in 1958. The major part of Tank's income, how-ever, comes from its investment in the Union Minière, which was able to main-Tank's profits, at £3,293,993, suffered to the extent of £153,000 only, and the carry forward, now standing at over £2,000,000, was well able to bear a reduction in its rate of growth.

Tanks are currently quoted around 44s. to yield about 8½ per cent, while Kentan, at 31s. 9d., yield fractionally more. Both are extremely promising investments for those who are in a posi-tion to exercise patience.

WESTERN AREAS-A CORRECTION

We find ourselves in the embarrassing position of having to confess to a mis-placed decimal point in the course of calculating likely earnings and dividends for Western Areas in this column a week ago. This has, of coure, invalidated our very optimistic conclusions.

On the other hand it is at least arguable that we were unduly cautious in our assumptions both regarding grade and the rate at which tonnage throughput might rise.

With regard to the grade in particular, market circles are anticipating a yield of perhaps 9 dwt. Against this must be set Johnnies' own official estimates of a return of 5.5 dwt. to 6 dwt. qualified by references to the possibility of selective mining.

The first thing to note is that on a basis of the initial target milling rate of 50,000 tons per month it is impossible to justify a price of more than 8s. 8d. with costs at 45s. and grade at 9 dwt. With a grade of 6 dwt. the prospective dividend would be about 6d. representing a current price of 4s. 6d. or so. (Both these figures allow for a waiting period of four years and are based on a prospective yield of 8 per cent.) However, calculation on a 50,000 ton throughput would appear to be of no more than academic interest to most investors who. on the basis of present unofficial deal-ings, must be thinking in terms of eventual milling rates. The question is how quickly this expanded level can be reached. In the case of Western Areas this is more than a mine development problem. It also assumes that Randproblem. It also assumes that Rand-fontein's useful life as a uranium pro-ducer will end with the expiration of the current contract in the mid-1960s.

If the rate of 200,000 tons per month If the rate of 200,000 tons per month can be reached within eight years a grade of 6 dwt. would mean an annual dividend of about 2s., representing a value now of 11s. 6d. allowing for the shortened life. An improvement in recovery to 9 dwt would give a current share value of about 21s. 6d.

It is clear, therefore, that though investors with rights to Western Areas shares at 10s. should exercise them withshares at 10s, should exercise them without any hesitation, it is impossible to
justify the price of 19s, to 20s, reached
in unofficial dealings in Johannesburg
except in terms either of a shorter waiting period before peak dividends are
reached or of a yield of almost 9 dwt.
coupled with a 200,000 ton per month
milling rate. The first of these alternatives seems unlikely, while the second
would involve a high rate of self-sorting
underground, or alternatively highly
selective mining, in which case a milling
rate of 200,000 tons per month would
be hard to achieve and maintain.

Financial News and Results

Giant Yellowknife Profits Up.—A higher milling rate and improved gold recovery enabled Giant Yellowknife Gold Mines to improve its 1957-8 net profit of \$784,350 to \$1,552,635 in the year to June 30 last. Two dividends, each of 15 per cent, were paid during the year. A new two-stage roasting plant went into operation in late 1958, and recovery has since reached 80 per cent compared with an average of 69 per cent in the 1958 financial year.

Mount Lyell Results.—After all charges, Mount Lyell Mining and Railway Co. made a profit of £291,276 in the year to June 30 last, compared with £365,142 in 1957-8. A final dividend of 1s. 3d. has been declared, making an unchanged total of 1s. 9d. for the year. The total of ore treated was slightly below the objective of 2,000,000 tons set by the chairman two years ago, but copper rechairman two years ago, but copper re-covered exceeded the target of 10,000 tons by a small margin. None of the ore treated came from underground treated came from underground ces. Meeting, Melbourne, October

Sungei Besi, Hong Fatt: Revised Terms.—Sungei Besi Mines has revised the terms of its offer for the issued capital of Hong Fatt (Sungei Besi). The basis of the new offer is \$1.50 cash and one Sungei Besi share for every five Hong Fatt shares. Acceptance of the new offer is recommended by the Hong Fatt directors. A formal offer will be sub-mitted to Hong Fatt shareholders in the near future.

Coming Events

The Associazione Italiana di Metallurgia have announced that their Electrometallurgical Centre is organizing a Symposium to take place in the Spring of 1960 in Milan. The subject will be the electrolysis of molten salts and the production of special non-ferrous metals by electrothermic methods Papers for presentation at this Symposium must be in the hands of the Secretary of the A.I.M., Via Moscova 16, Milan, Italy, by December 31, 1959.

At a General Meeting of the Institution of Plant Engineers at the Royal Society of Arts, John Adam Street, Adelphi, Strand, on Tuesday, November 3, at 7.0 p.m., Mr. T. A. L. Paton, B.Sc., Senior Partner, Sir Alexander Gibb & Partners, will present a paper on "The Constructional Problems encountered in the Kariba Dam hydro-electric project". This is the first of a programme of three special lectures open to non-members which have been arranged for the current session.

The Surface Activity Group Society of Chemical Industry is holding an International Symposium on Powders in Industry on September 29 and 30, 1960, at The Royal Institution, London. The chairman of the Group is Sir Eric Rideal, M.B.E., F.R.I.C., F.R.S., and the chairman of the organizing committee is Dr. M. G. Fleming, M.I.M.M., M.A.I.M.E., M.C.I.M.M., of the Bessemer Laboratory, Imperial College of Science and Technology. A preliminary programme and further information may be obtained from the Hon. Secretary of the Surface Activity Group, the Society of Chemical Industry, 14, Belgrave Square, London, S.W.1.

LONDON METAL AND ORE PRICES, OCT. 1, 1959.

METAL PRICES

Aluminium, 99.5%, £180 per ton Antimony— English (99%) delivered, 10 cwt. and over £190 per ton English (37 %) per ton per ton Crude (70%) £190 per ton Ore (60%) bases 19s. 6d./20s. 6d. nom. per unit,

Arsenic, £400 per ton
Biamuth (min. I ton lots) 16s. lb. nom.
Cadmium 9s. 0d. lb.
Cerium (99%) net, £16 0s. lb. delivered U.K.
Chromium, Cr. 99% 6s. 11d./7s. 4d. lb.
Cobalt, 14s. lb.
Germanium, 99.99%, Ge. kilo lots 2s. 5d. per gram
Cald 25th, 6id. Gold, 250s. 6\d.

Iridium, £23/£25 oz. nom.
Lanthanum (98/99%) 15s. per gram.
Manganese Metal (96% 98%) £245/£250
Magnesium, 2s. 3d. lb.
Nickel, 99.5% (home trade) £600 per ton
Osmium, £21/£23 oz. nom.
Osmium, £21/£23 oz. nom. Osmiridium, nom., Palladium, £6 10s./£7 10s.
Palladium, £6 10s./£7 10s.
Platinum U.K. and Empire Refined £28 10s. oz
Imported £26;½£27}
Quicksilver, £71;½72 ex-warehouse
Rhodium, £41;£45 oz
Ruthenium, £18;£20 oz. nom,
Selenium, 50s. 0d. per lb.
Silver, 79;40 f. oz. spot and 78;‡d. f'd
Tellurium, 18s. lb.

ORES AND OVIDES

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Bismuth						• •			30 % 5s. 0d. lb. c.i.f. 20 % 3s. 3d. lb. c.i.f.
Chrome Ore-									
Rhodesian	Metallur	zical (se	mifriable	e) 48 %	(Ratio	3:1)			£15 15s. 0d. per ton c.i.f.
**	Hard Lu	mpy 45	/		(Ratio	3:1)			£15 10s, 0d. per ton c.i.f.
	Refractor								£11 0s. 0d. per ton c.i.f.
**	Smalls 44				(Ratio				£14 0s. 0d. per ton c.i.f.
Baluchistan					(Ratio				£11 15s. 0d. per ton f.o.b.
Columbite, 6	5% comb	ined ox	des, hig						nom.
Fluorspar-	0 /6 00.000	anoa on	,	m 8					1
Acid Grad	e. Flotate	d Mater	ial						£22 13s. 3d. per ton ex. works
Metallurgi	cal (75/80	% CoE	101		**				156s. Od. ex works
Lithium Ore		/o Car 1)			* *			150s. Od. ox WOLKS
		i.O .							40- 04 /46- 04
Petalite mi Lepidolite	m. 37/0 L	110					* *		40s. Od./45s. Od. per unit f.o.b. Beir
				* **					40s. 0d./45s. 0d. per unit f.o.b. Beira
Amblygon						* *		* *	£25 0s. per ton f.o.b. Beira
Magnesite, g	round cal	cined .							£28 0s./£30 0s. d/d
Magnesite R	aw (groun	id)							£21 0s./£23 0s. d/d
Manganese (
Europe (46	5% - 48%) basis 5	7s. 6d.	treight		* *			nom.
Manganese (Ore (43 %	- 45%)							nom.
Manganese (Ore (38 %	- 40%							nom.
Molybdenite	(85%) ba	sis .							8s. 11d. per lb. (f.o.b.)
Titanium Or									
Rutile 95/9	7% TiO.	(promp	t deliver	y)					£29/£30 per ton c.i.f. Aust'n.
Ilmenite 52	2/54 % Tie	D.							£11 10s. per ton c.i.f. Malayan
Wolfram and	1 Schoolite	(65%)							140s. 0d./145s. 0d. per unit c.i.f.
Vanadium-		(/6/							a ross out a ross out per unit estat.
Fused oxid		.0.							8s./8s. 11d. per lb. V.O. c.i.f
Zircon Sand					• •				£16/£17 ton c.i.f.
ZHOOH SKIIG	(Armaci atti	an) 05 -	00 /6 54	U ₂)	* *	0.0			Elo/El/ton C.I.I.

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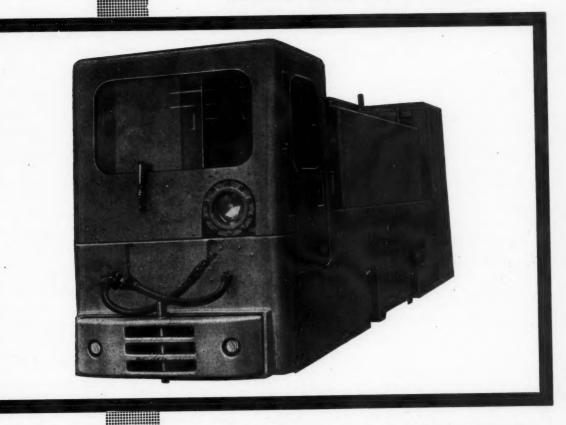
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Illustration shows 12-ton locomotive-18 in. gauge.

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RIBON VALLEY (NIGERIA)

The annual general meeting of Ribon Valley (Nigeria) Tinfields, Ltd., was held on September 24 London.

Mr. A. Hedley Williams, M.I.M.M., M.Inst.Pet., Chairman, presided, and the following is an extract from his circulated Statement.

The acounts for the year to March 31, 1959, after making provision for depreciation and writing off prospecting and development expenditure, show a loss of £1,498 compared with a profit of £5,786 for the previous year. It should be noted that this result has been achieved in spite of a cut in production of more than 50 per cent. owing to the effect of Tin Restriction.

Addressing the meeting the Chairman said:—It is encouraging to note that the International Tin Council has been able to increase progressively, during this year, the exportable quotas of member countries, and as a result of the recent increase granted in respect of the fourth quarter, it is hoped that following amalgamation our exports for the 12 months to March 31, 1960, will not be less than 194 tons. This presents a more favourable picture than that anticipated in my review, and it is hoped, with the measures for amalgamation now put forward with United Tin Areas of Nigeria, Ltd., that we shall be able to conduct a profitable operation for the year.

Another satisfactory feature is the improving market for Columbite, the demand for which now is such as to justify increasing the scale of operations at Odegi.

Should the amalgamation scheme be approved by both Companies, we intend to test the Odegi leases far more fully than has been practicable to date in order to ascertain their potential, and to prepare for an expansion of production when circumstances permit.

The report and accounts were adopted.

At the Extraordinary General Meeting which followed the proposals for the amalgamation with United Tin Areas of Nigeria Limited, and liquidation were approved.

UNITED TIN AREAS OF NIGERIA

The annual general meeting of United Tin Areas of Nigeria, Ltd., was held on September 24 London.

Mr. A. Hedley Williams, M.I.M.M., M.Inst.Pet. (Chairman), presided and the following is an extract from his circulated Statement:—

The accounts for the year to March 31, 1959, after meeting all charges including the £3,923 for depreciation, show a loss of £7,987 compared with £11,895 for the previous year. Output of concentrates totalled 58 tons, of which 54 tons were tin ore and 3½ tons columbite.

Addressing the meeting the Chairman said:—It is encouraging to note that the International Tin Council has been able to increase progressively during this year the exportable quotas of member countries, and as a result of the recent increase granted in respect of the fourth quarter it is hoped that following amalgamation our exportable quota to

March 31, 1960, will not be less than 194 tons. This presents a more favourable picture than that anticipated in my review, and it is hoped with the measures for amalgamation with Ribon Valley (Nigeria) Tinfields, Ltd. now put forward that we shall be able to conduct a profitable operation for the year.

Another satisfactory feature is the improving market for Columbite, the demand for which now is, such as to justify increasing the scale of operations at Odegi.

If the Amalgamation Scheme is approved, we intend to test the Odegi Leases far more fully than has been practicable to date, in order to ascertain their potential and to prepare for an expansion of production when circumstances permit.

The report and accounts were adopted.

At the Extraordinary General Meeting which followed the proposals for the amalgamation with Ribon Valley (Nigeria) Tinfields, Limited, were approved.

SIR LINDSAY PARKINSON & CO.

WORK IN HAND EXCEEDS £17,000,000

MR. A. E. PARKINSON'S REVIEW

The Twenty-second Annual Ordinary General Meeting of Sir Lindsay Parkinson and Co., Ltd., was held on September 29 at the Piccadilly Hotel, London.

The following is an extract from the circulated statement of Mr. A. E. Parkinson, Chairman:

Accounts

The Group Profit for 1958 applicable to the Members of the Parent Company before Taxation amounts to £270,500 as compared with £218,428 for 1957. Taxation amounts to £134,997 against the charge of £121,798 for 1957. The Group Profit and Loss Account Balance carried forward amounts to £398,375 compared with £304,235 brought in. The Consolidated Balance Sheet shows a surplus of Current Assets over Current Liabilities and Provisions amounting to £333,300 compared with £401,851 last year.

Contracts

Home: Our work continues to include a wide variety of Building and Civil Engineering contracts. The Building Department has obtained a number of contracts for the Ministry of Works including Telephone Exchanges, Post Offices and other public buildings. The War Office have in recent months awarded us a contract for the erection of new Permanent Barracks at Catterick Camp, Yorkshire, the value of which is in excess of one million pounds. During 1958 there was a significant increase in our Speculative Building Department, and that part of our business continues to expand. On the Lancaster Motorway contract, after the deplorable weather throughout 1958, the fine Summer of 1959 has enabled us to make good progress and to recover some of the lost time.

Canada: Our Montreal Subsidiary Company continues to operate profitably.

Cyprus: Apart from the extension works on the Dhekelia Power Station,

all our contracts in the Island have now been completed.

British Guiana: This contract is now approaching completion, and is scheduled to be finished before the end of this year.

Nigeria: We have recently been entrusted with a contract for the construction of Television Studios and Transmitter Stations in Western Nigeria for the Government of Western Nigeria in association with Overseas Rediffusion Ltd.

Ghana: Considerable progress has been made on the Tema Harbour contract, which is being carried out by Parkinson Howard Ltd. The main contract is nearing completion, and the final value will exceed £12 million. During the current year the associated Company has secured a contract for a new road in connection with the preliminary part of the Volta River Scheme, at a value of some £400,000.

Dividends

The final dividend to be recommended on the Ordinary Stock is 12½ per cent. (less tax), making a total for the year 1958 of 15 per cent. (less tax). It has been decided to declare a special interim dividend for 1959 of 6 per cent. (less tax), payable together with the final dividend for 1958. The amount of this special interim dividend will not be taken into account when deciding the further distributions to be made or recommended for the year 1959.

Conclusion

Subject only to the contraction taking place in opencast coal production, there would now seem to be every prospect of the Company maintaining its present turnover. At the present time the value of the work in hand of our Group amounts to some £17 millions.

The report and accounts were adopted.

Book Reviews

Grundlagen und Anwendung der Röntgen-Feinstruktur-Analyse by Dr. Hans Neff. Published by R. Oldenbourg Verlag, G.m.b.H., Rosenheimerstrasse 145, Munich, Germany, 447 pp., 348 pictures and 49 tables. Price DM.73,

The author of this book, Dr. Hans Neff, is in charge of a laboratory at the Siemens and Halske organization, and he is a lecturer on x-ray diffractometry at the Technical College in Karlsruhe. In writing this book the author had a tourfold objective. Firstly, he deals with basic crystallographic and diffraction law theory, a knowledge of which is indispensable for all workers in this field of x-ray diffractometry. Secondly, he treats the handling of inspection equipment and the measurement of radiation with counter tubes. A third section gives a detailed description of the analysis of powder diagrams, and the closing chapter reviews the present state of crystal chemistry and the principal laws governing crystal structure.

The author is an expert with many years of practical experience, and this book will make profitable reading, not only for those engaged in x-ray spectrometry, but also for physicists, chemists and engineers who wish to familiarize themselves with the fundamentals of this branch of technology.

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This feature appears every fourth week

COMPANY NEWS

Mr. S. W. F. Patching, formerly head of the Mineral Dressing Group for the Atomic Energy Authority at Harwell, has joined Baker Perkins Ltd., as manager of their new Mineral Processing Department. His appointment follows the signing of an agreement between Baker Perkins and the Ministry of Develop-ment of the Government of Israel for ment of the Government of Israel for the exploitation of a process for mineral ore dressing and coal preparation, based on the use of a heavy liquid, tetrabro-moethane (T.B.E.). This liquid is ex-tracted from the waters of the Dead Sea by a new and economic process perfected by the Israel Mining Industries. They have also developed a dressing process have also developed a dressing process which is particularly suitable for the enrichment of relatively poor and difficult ores. Baker Perkins will design, build and sell special equipment for ore dressing by the T.B.E. process and will market T.B.E. for use in these plants.

Keelavite Hydraulics Ltd., of Allesley, Coventry, have appointed Holman Bros. (Pty.) Ltd., P.O. Box 6218, Johannesburg, as their agent for the sale of hydraulic equipment in South Africa and Rhodesia. Holman Bros. are manufacturing hydraulic cylinders under licence from Keelavite.

Neldco Processes Ltd., have been appointed sole agents for the sterling area for Krebs Cyclones.

Crawley Industrial Products Ltd., makers of many types of conveyors, loaders and other equipment for the mining industry, are building a new factory on land acquired from Llanelly Harbour Trustees. Crawley Industrial Products Ltd., is a member company of the Ayling Industries Group.

An order has recently been received from the Denver Equipment Co. for classifiers valued at £19,163 to three classifiers valued at £19,163 to be installed at a copper mine in Haiti. This equipment will be supplied by Head Wrightson Stockton Forge Ltd., a subsidiary of Head Wrightson and Co. Ltd., to handle 500 s.tons per day of copper ore. The installation is part of a new development project at the mine to increase production and the classifiers will be of the 66 in. simplex double pitch submerged type with a tank length of over 35 ft. and a spiral speed of 34 r.p.m. The classifiers will overflow all —100 mesh copper ore. 100 mesh copper ore.

American Nepheline Ltd., has been given an Exploratory License of Occupation covering 570,240 acres in Cochrane, Ontario. The license, issued in the rane, Ontario. The license, issued in the first place for three years, gives the right to explore for kaolin, fire clay, ball clay and silica sand, but other minerals are specifically excepted. The American Nepheline Co. is a Canadian company associated with Ventures Ltd. in this work, and if it is successful and decides to go into production, will be granted a ten year lease, with option of renewal.

Goodyear International Corporation have announced that they have selected have announced that they have selected Amiens in France for the construction of Goodyear Tyre and Rubber Co.'s new \$7,000,000 plant. Goodyear is represented in 29 foreign countries, and this, their fifteenth overseas plant, is the first American rubber factory to be built in France. head or the arwell, manmanning Dews the Baker velopel for hineral based rabrois exad Sea fected They brocess he enifficult build edresel mar-

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